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9 November 1961  
GSG Report No. 1610.30/163  
SD 61-186

MONTHLY PROGRESS REPORT  
ON THE  
FEASIBILITY AND DESIGN STUDY FOR COLLECTIVE  
PROTECTION EQUIPMENT FOR THE AN/MSG-4 SYSTEM

CONTRACT NO: DA 18-108 CML-6618

REPORT PERIOD: Technical Report, 1 October 1961 to 1 November 1961  
(4th Month)  
Financial Report, 1 October 1961 to 1 November 1961  
(4th Month)

TO: Commanding Officer  
U. S. Army Chemical Research and  
Development Laboratories

ATTENTION: Contract Project Officer  
U. S. Army Chemical Center  
Edgewood, Maryland

PURPOSE OF THE STUDY

The purpose of this study is to evaluate the feasibility of installing collective protection (air filtration) equipment on semitrailer vans, trucks, and air transportable shelters that contain the various subsystems of the AN/MSG-4 Antiaircraft Defense System. The collective protection equipment will include: a chemical, bacteriological, and radiological (CBR) filter for filtering irritating, noxious, and toxic gases and aerosols from the air; a pressure-control device to maintain minimum pressure of the air conditioning system; and an air lock that permits personnel to make safe entry and exit from the various vehicles and shelters. Mock-ups of proposed CBR filters and a mockup of a protective entrance will be fabricated following completion of the initial phase of the feasibility study. The activities during the month of October are described on the following pages.

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### GENERAL

The filter assembly design has progressed to the point that it appears possible one filter assembly configuration can be made to serve all AN/MSG-4 System vehicles and shelters, except the AN/MPS-23 antenna trailer. New design requirements for the antenna trailer filter have been established. Protective entrance design has been concentrated on the entrance for the AN/TSQ-38 Helihut. That design has been revised to provide two entrance compartments in series. The entrance for other vehicles remains a single compartment entrance.

On the 3rd and 4th of October, 1961, Mr. M.D. Mears of the Air Filtration Branch, U.S. Army Chemical Center, Maryland, visited the Hughes Aircraft Company, Fullerton, California. The purpose of the visit was to review the design concepts established for the CBR filter and the protective entrance. These concepts were described fully in the third Monthly Progress Report. Mr. Mears offered ideas for improving the designs and pointed out areas that need further investigation. The most important points discussed are included in the following paragraphs on study progress.

### STUDY PROGRESS - CBR FILTER

#### AN/MPS-23 Antenna Trailer

The second Monthly Progress Report stated that the required capacity of the CBR filter would be 2000 cfm, and the physical size would be such that a separate means of conveyance would be required. Mr. Mears suggested that, in order to reduce the size of the filter unit, the blower be sized to match the capacity of the radome pressurizing blowers only when they are maintaining inflation of the radome, and not when they are initially inflating it from a collapsed position. Therefore, the size of the filter elements and their blower will be determined for that condition. It was also determined by Mr. Mears that the gas filter element could not be eliminated to further reduce the size of the filter assembly.

#### Other Vehicles and Shelters (Except Antenna Trailer)

The preliminary control system diagram was arranged to provide for filter operation from either the control panel on the CBR filter or from an internal remote panel. It would not, however, permit the filter

to be started from one location and stopped from the other. This capability has been added at the request of Mr. Mears.

The preliminary control diagram provided for the contingency that the CBR filter might be operated without the protective entrance installed on the vehicle or shelter. Without the protective entrance, the pressure differential would make shelter or vehicle door closure difficult, and opening the door could cause a negative pressure in the suction plenum of the air conditioner. A door interlock was planned to stop all blowers prior to opening the door, thus preventing negative pressures and permitting easy door closure. Upon Mr. Mears' recommendation the feature was deleted, because Category A protective filtration equipment requires the use of the protective entrance, and therefore the CBR filter would not be utilized during emergency unless the entrance is in place.

The size of the CBR filter being designed (Phase I, Mockup) is determined by the space originally allocated for it between the air conditioners on the production AN/MSQ-28 RDPC, WMC, and RET semi-trailers. The space available for mounting the blower within the CBR filter is very limited. A direct drive blower assembly would be the most desirable, but is not readily available in a size suitable for packaging requirements. A speed increaser gearbox will be utilized to give the necessary high rotative speeds to a suitably sized blower wheel. Since it is the Hughes' objective to design for mounting in either the horizontal or vertical positions, the speed increaser gearbox must be designed to operate in more than one position. Proper vent plug location makes this possible, providing the blower is mounted within the CBR filter so that its motor shaft is always horizontal regardless of the CBR filter mounting position. This dual mounting design reduces the number of models required. A further reduction in the number of models required is possible because the blower performance curves indicate that the blower wheel delivering 300 cfm of air against a static pressure of 11 inches  $H_2O$  will also be capable of delivering 400 cfm against a static pressure of 10 inches  $H_2O$ . This performance fits the design requirements of all vehicles and shelters considered. It therefore appears possible to have one CBR filter assembly that can serve all of the vehicles and shelters in the AN/MSG-4 System (antenna trailer excepted). Even though a suitable blower is available, a search for a compact, direct drive blower assembly small enough to be incorporated in the CBR filter package is continuing. Lower cost and higher reliability are the motivating factors.

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## STUDY PROGRESS - PROTECTIVE ENTRANCE

### AN/TSQ-38 Helihuts

The design concept of the protective entrance has been revised to provide two compartments. Personnel entering from a contaminated atmosphere decontaminate themselves and remove their clothing in the first compartment. They then step into the inner compartment where further decontamination takes place, and put on fresh clothing in the inner compartment before entering the shelter. The inner compartment minimizes the possibility that contaminants will be swept into the shelter.

The entrance retains all of the basic features described in the third Monthly Progress Report. The cross-sectional shape is now oval rather than circular, and the shape is maintained by the fabric wall separating the two chambers. The plenum chamber above the fabric ceiling is common to both the inner and outer chambers. A slide fastener (zipper) in the separating wall provides a means of passage between the inner and outer chambers.

### Other Vehicles and Shelters (Except Helihuts)

The protective entrances for all vehicles are entered at ground level. The entrance encloses the ladder which is required to enter the vehicle. In ascending the ladder, personnel leave the region of maximum contamination. The higher-than-ground level entrance minimizes the possibility that contaminants will be swept into the vehicle, and accomplishes the same function as the inner chamber of the protective entrance for the AN/TSQ-38 Helihut. One design change, suggested by Mr. Mears, was to round the corners of the previously rectangular door for better operation of the slide fastener. This feature has been incorporated.

## FINANCIAL SUMMARY

The funds expended, man hours expended, estimated costs for the next reporting month, and the balance of contract funds are shown in the following summary:

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	October 1961		Cumulative thru October 1961		Estimated for November	
	Man Hours	Total Dollars	Man Hours	Total Dollars	Man Hours	Total Dollars
Expenditures*	492	5947.00	1,318	14,269.00	608	7,232.00

Contract Cost Funds**	\$46,025.00
Less Cumulative Costs	\$14,269.00
Balance Remaining	\$31,756.00

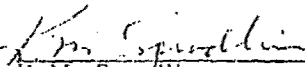
\* Expenditures shown are manufacturing costs including applied burden, and general and administrative expenses.

\*\* Contract cost funds are funds negotiated excluding fee.

#### PLANNED ACTIVITY FOR THE NEXT REPORTING PERIOD

- The capacity and configuration of the CBR filter for the AN/MPS-23 antenna trailer will be determined and the components selected.
- Phase I Mockup construction of the protective entrance will commence.
- Design of the CBR Filter (AN/MPS-23 antenna trailer filter excepted) will be completed, and construction of the Phase I Mockup will commence.

HUGHES AIRCRAFT COMPANY  
Ground Systems Group

  
K. M. Spradlin  
Project Manager  
ADCP Production Program

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